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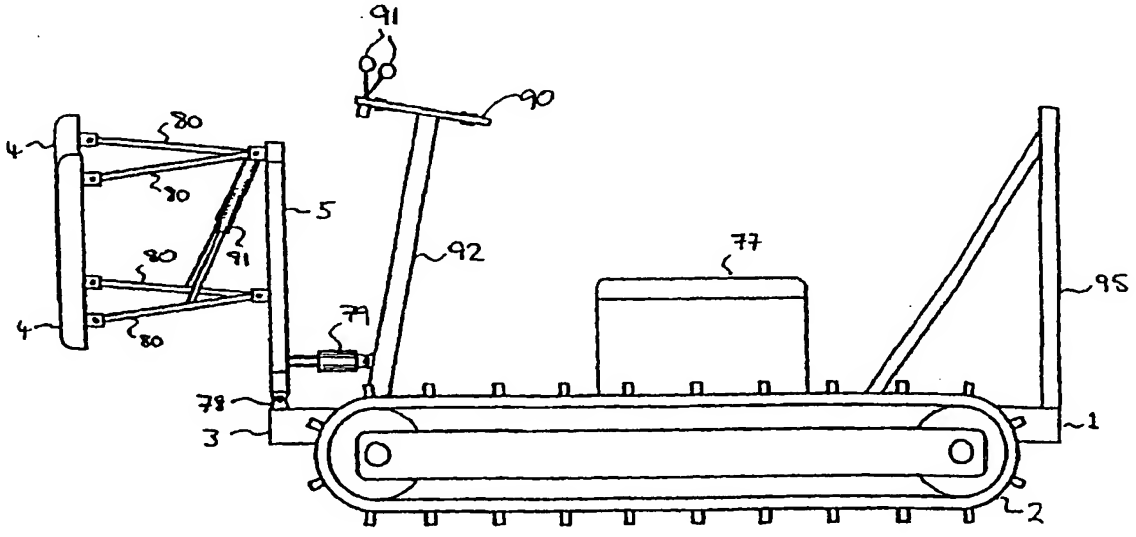
(54) Title: SPORTS TRAINING RESISTANCE DEVICE



(57) Abstract: A sports training resistance device with particular application for the simulation of rugby scrummaging provides a manoeuvrable motorised device capable of driving player-engaging impact members or resisting pressures in horizontal and vertical directions. The scrum simulator may have player-engaging impact members capable of independent or coordinated movement and

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SPORTS TRAINING RESISTANCE DEVICE

TECHNICAL FIELD

This invention relates to a motorised sports training resistance device. Participants of field sports can be trained or prepared by practicing against the device. The device provides a resistance against which participants can train while stationary or while moving, both forwards and backwards. The device simulates sports activities involving contact between players and is particularly suitable for simulating part of a rugby scrum.

BACKGROUND ART

Sports teams and athletes have traditionally used a wide range of apparatus to introduce resistance to their training. In some cases the apparatus may be as simple as dragging a tyre on a rope fastened to the athlete. In the case of rugby teams, scrum machines consisting of weighted sleds with pads to engage the shoulders of front row players have been used. The pads or a frame supporting the pads may be set on compression springs to provide scrum machines with some elasticity. Some scrum machines incorporate weighted or braked rollers serving as wheels and some use pneumatics or hydraulics to raise and lower or thrust forward or retract the row of pads.

DISCLOSURE OF INVENTION

In a first aspect the present invention consists in a motorised sports training resistance device comprising a ground contact vehicle including a motor adapted to move the vehicle along the ground and at least one impact member mounted on the vehicle and against which a player may impact in use.

Preferably the vehicle is a vehicle which rides on endless tracks.

Preferably the vehicle has two tracks which are drivable independently of each other.

In forms of the invention wherein wheels are used rather than tracks, preferably at least one wheel is capable of being driven independently of any other driven wheel or wheels.

Preferably the tracks are made of a rubber material.

Preferably a plurality of impact members are mounted on the vehicle.

Preferably four impact members are mounted at one end of the vehicle the construction and arrangement being such that the impact members may be situated in a substantially linear and horizontal row.

Preferably the positions of the impact members relative to the vehicle are adjustable by an actuator means.

Preferably the positions of the impact members relative to each other are adjustable by the actuator means.

Preferably the actuator means includes a hydraulically operated, bi-directional linear actuator which is adapted to adjust the position of the impact members while the device is in use.

Preferably the actuator means includes a plurality of hydraulically operated, bi-directional linear actuators which is adapted to adjust the position of the impact members while the device is in use.

In other forms of the invention the actuator means may include a plurality of pneumatically or mechanically operated, bi-directional linear actuators.

Preferably the or each impact member includes a cushioned pad against which a player may impact in use.

Preferably the device has a impact and pressure sensor means.

Preferably the device has a plurality of impact and pressure sensor means.

Preferably the pressure sensor means also includes a display means.

Preferably, the impact and pressure sensor means includes a gauge adapted to record and display pressure in hydraulic or pneumatic actuators or may include load cells and displays.

Preferably the device includes a control system.

Preferably the control system allows an operator to adjust the operation of the motor and/or articulated tracks and/or the actuator means.

In other forms of the invention the control system may include a processor means adapted to adjust the operation of the articulated tracks and/or the actuator means in accordance with a pre-set program or in response to data fed to the processor by the impact and pressure measuring means.

In a second aspect the present invention consists in a sports training resistance device including a ground contact vehicle and a plurality of impact members adjustably mounted to the ground contact vehicle and against which a player or players may impact in use, wherein the position of at least one impact member relative to the vehicle and to another impact member is, in use, adjustable by an actuator means.

Preferably four impact members are mounted at one end of the vehicle the construction and arrangement being such that the impact members may be situated in a substantially linear and horizontal row.

Preferably the positions of all the impact members relative to the vehicle are adjustable by the actuator means.

Preferably the actuator means includes a hydraulically operated, bi-directional linear actuator which is adapted to adjust the position of the impact members while the device is in use.

Preferably the actuator means includes a plurality of hydraulically operated, bi-directional linear actuators which is adapted to adjust the position of the impact members while the device is in use.

In other forms of the invention the actuator means may include a plurality of pneumatically or mechanically operated, bi-directional linear actuators.

Preferably the positions of the impact members relative to each other are adjustable by the actuator means.

Preferably each impact member includes a cushioned pad against which a player may impact in use.

Preferably the ground contact vehicle includes a motor adapted to move the vehicle along the ground.

Preferably the vehicle is a vehicle which rides on endless tracks.

Preferably the vehicle has two tracks which are drivable independently of each other.

Preferably the actuator means for the impact members may operate using the motor that is also adapted to move the vehicle along the ground.

In a third aspect the present invention consists in a sports training resistance device comprising a primary frame, at least one impact member mounted on the primary frame and against which a player may impact in use, and an impact and pressure sensor means.

Preferably, the impact and pressure sensor means includes a plurality of sensors.

Preferably, the impact and pressure sensor means includes a display means.

Preferably a plurality of impact members are mounted on the vehicle.

Preferably four impact members are mounted at one end of the vehicle the construction and arrangement being such that the impact members can be arranged in a substantially linear and horizontal row.

Preferably the positions of the impact members are adjustable by an actuator means.

Preferably the or each impact member includes a cushioned pad against which a player may impact in use.

Preferably the device also includes a processor means adapted to receive data from the impact and pressure sensor means.

Preferably the processor means is also adapted to control the actuator means.

Preferably the vehicle includes a motor adapted to drive the vehicle on endless tracks.

Preferably the vehicle has two tracks which are drivable independently of each other.

Preferably the processor means is also adapted to control the motor and tracks.

BRIEF DESCRIPTION OF DRAWINGS

One preferred form of the invention will now be described with reference to the accompanying drawings in which:

Figure 1 shows a schematic side elevation of a preferred form of a sports training resistance device.

Figure 2 shows a schematic front elevation view of a preferred form of a sports training resistance device

Figure 3 shows a perspective view of the forward region of a preferred form of a sports training resistance device.

MODES FOR CARRYING OUT THE INVENTION

The preferred form of the invention as shown in Figures 1, 2 and 3 is a sports training resistance device comprising a scrum simulator and is particularly suitable for simulating one half of a rugby football scrummage. This scrum simulator accurately simulates scrummage situations so that players trained against the simulator can perfect or at least improve their scrummaging techniques and their strength and stamina when scrummaging.

The scrum simulator includes a vehicle 1 which rides on motor-driven endless tracks 2. The tracks provide a high degree of traction against the ground and give the vehicle good mobility and maneuverability. The scrum simulator has a primary frame 3. At one end of the vehicle there are provided pads 4. In the embodiment shown there are four pads although the device is not limited to only having four pads or to having four pads.

The preferred embodiment shown in figure 1 also has a structure 95 capable of receiving further pads of varying sizes.

The pads 4 are attached to a secondary frame 5 mounted on the primary frame 3. The pads 4 may be aligned in a row to simulate the front row of a scrum. Players impact against the pads when training with the scrum simulator.

The scrum simulator includes a braking arrangement (not shown) whereby the simulator resists movement so that players training as a forward pack against the simulator can exert pressure on the pads. When this pressure exceeds the braking effect, the players can move forward, pushing the simulator ahead of them. A pressure relief valve may be used to reduce or limit the braking effect when the pressure exerted on the pads exceeds a pre-set level, for example 2000 kg.

The motor or motors (not shown) are housed in a housing 77 and drive the tracks 2. The motor or motors are preferably powered from an electric storage battery (not shown). Alternatives for powering the motors include diesel, petrol, liquid petroleum gas or a solar energy collector.

The braking effect discussed above can be provided by the motor driving the tracks. The scrum simulator can be motor driven in either direction and can be driven while resisting the pressure applied by the forward pack against the pads. For example, the scrum simulator may move ahead of a forward pack pushing against the pads, hold the forward pack or may drive a forward pack backwards. The speed of the scrum simulator may be varied, for example to simulate a rolling maul or a scrum moving backward or forward at a rabbit or turtle pace.

By driving the tracks at each side of the scrum simulator independently, the simulator may be turned left or right to simulate the screwing of a scrum. This permits players to

train against an accurate simulation of a screwing scrum to perfect, or at least improve, that aspect of play.

The secondary frame 5 is attached to the primary frame 3 by way of pivots 78 and compression ram 79.

The impact members or pads 4 are pivotally mounted on struts 80 extending from and pivotally mounted on the secondary frame 5. Bi-directional rams 81 are pivotally attached to the struts and pivotally attached to the secondary frame. In the preferred form as shown the struts relating to first and second pads are linked by cross-struts 82, 83. The struts relating to third and fourth pads are also linked by cross-struts 84,85. In the preferred form as shown in Figure 3 the bi-directional rams are each pivotally attached to a cross-strut.

Actuation of the bi-directional rams adjusts the position of the struts and thus the pads relative to the secondary frame and the vehicle. In the preferred form as shown the first and second pads move together and the second and third pads move together. In other forms of the invention each pad may have its own bi-directional ram allowing independent movement of each pad. The independent and/or coordinated movement of pads, pairs of pads or sets of pads allows the device to simulate a range of scrum situations including buckling of the front row, popping scrums and collapsing scrums. Further each of these situations can be simulated to encompass scrum problems that are initiated at either the tighthead or loosehead side of the scrum. For instance the pads may be lowered sequentially from the right side pad to the left side pad to simulate a scrum being collapsed by the tighthead prop of the opposing team.

By dropping the pads in a controlled manner, the simulator can be used when training new, and especially young, players to adopt the correct positions to help reduce the incidence of neck and back injuries in scrums.

The bi-directional rams in the preferred form as shown in Figures 1-3 are hydraulic rams but may be pneumatic rams or other motorised actuators. The hydraulic rams are supplied with pressurised hydraulic fluid by the motor via hoses (not shown). The articulated tracks are also driven, independently of one another, by hydraulic pressure supplied by the motor via hoses that are also not shown. In the preferred form the hydraulic pressure for the tracks and rams is supplied by a single motor housed in the motor housing though more than one motor could be used.

The device also includes a hydraulic compression ram 79. The compression ram is also pressurised by the motor. The compression ram absorbs the impact of the initial hit i.e. the initial impact when a formation of players engages with the device. In other forms of the invention other forms of shock absorber such as a compression spring could be utilised.

In the preferred form as shown in Figures 1 and 2 the device also includes a control panel 90. The control panel is situated on an upright 92 extending from the primary frame 3. The control panel has a series of gauges (mostly not shown) and four levers 91. The control panel may also have an ignition switch for the motor, and fuel gauges, rev counters etc. The levers operate a series of valves (not shown) that regulate the hydraulic pressure supplied to the tracks and the bi-directional rams. In the preferred form as illustrated there are two bi-directional rams and two tracks. Thus there are four levers each corresponding to a ram or a track. By adjustment of the respective levers the positioning of the device and the extent of the pressure applied on players in any given direction can be varied.

The gauges measure the pressures of the hydraulic fluid in the hoses corresponding to the tracks and the rams including the compression ram 79. Thus they reflect, the pressures being exerted on the players by the device and by the players on the device. This information can be used to measure the strength

and progress of the players, to simulate specific scrum situations, and to aid in the operation of the device.

In other forms of the invention other control systems may be used. Digital readouts, keyboards and cabling for instance may substitute for gauges, levers and hoses and mechanical actuators may substitute for hydraulics.

In addition to or instead of the gauges, the scrum simulator can include one or more sensors (not shown), for example proximity sensors, pressure sensors, load cells and strain gauges, to monitor the force or pressure applied against the device or against individual pads, or to monitor the movement of the pads and/or secondary frame relative to the vehicle. The sensors can monitor applied pressure or movement along one axis, or along two or more axes.

Monitored pressures and movements can be displayed on readouts (not shown), for example digital displays, or recorded for later retrieval and analysis. The scrum simulator may monitor and display the magnitude and timing of the applied forces of the hit of the initial engagement impact and of the sustained push, on the beam or on each individual pad. This information can be used to identify late or weak engagements or unsustained pushes. Information gathered from pressures and movements monitored during a training exercise on the scrum simulator can be retained and used for programming the movement and action of the simulator, or another similar simulator, in a later simulation or re-enactment of the exercise.

The scrum simulator can incorporate signaling devices, for example audible beepers or loudspeakers, to provide a signal to the players training against the simulator. The signals can be made in response to monitored forces or pressures and used to indicate the achievement of a particular level of performance. The effectiveness of the simulator in a coaching situation can be improved by this provision of feedback from the simulator to players training against the simulator.. A

loudspeaker can be used to voice information, for example regarding particular forces or pressures achieved or the accumulating period over which a force or pressure is being maintained.

The scrum simulator can be controlled by an operator from a position on the simulator or by a remote control (not shown) connected to the simulator, for example by cable or other umbilical cord, or by a wireless connection.

The operator can control the speed and direction of the vehicle movement and the positioning of the secondary frame or individual pads. Information from the gauges or monitored sensors displayed by the readouts may be used by the operator when controlling the simulator and coaching players using the simulator.

The speed and direction of the vehicle movement and the positioning of the secondary frame or individual pads may be computer-controlled in response to actions of a forward pack training against the scrum simulator and detected by the sensors, or to follow a set pattern in response to a pre-selected program. The simulator may be programmed and controlled by a computer programmed to follow a set pattern to simulate a particular scrum, for example one that a team has had problems with in an earlier game. The program may be based upon recorded data monitored during an earlier training exercise on the same or a similar simulator. In this way players can be trained against a scrum simulator programmed to simulate the performance of other players.

The scrum simulator may be programmed to perform a preset scrum pattern which commences only when a predetermined level of pressure or force has been applied against the beam or pads of the simulator. A sound or voice command, generated by the scrum simulator and delivered, for example by a beeper or loudspeaker, may be given to the players training against the simulator to engage the simulator. The simulator may thus be

pre-set for a particular training activity and used by players without the need for a separate operator.

As a fail-safe measure, the simulator can be programmed to be stationary when there is no pressure applied to the beam or pads, or when no pressure has been applied to the beam or pads for at least a predetermined length of time.

The scrum simulator can be modified for training players on driving mauls, by the fitting of larger pads to the front or rear of the device. The scrum simulator can be modified for training a rugby league player to drive through a tackle while being pushed forward or backward, by the fitting of widely spaced pads.

In a second preferred form, not shown, the sports training resistance device is a fixed or perambulatory scrum simulator which simulates one half of a rugby football scrummage. This scrum simulator simulates scrummage situations so that players trained against the simulator can perfect or at least improve their scrummaging techniques and their strength and stamina when scrummaging.

In one embodiment of this form there are four pads, although the device is not limited to having four pads. The pad or pads may be attached to a vehicle or mounted to a fixture. A player or players impact against the pad or pads when training with the scrum simulator.. The position of the pads relative to the fixture or vehicle to which they are attached is adjustable by one or more motor-driven actuators adapted to move the pads relative to the fixture or vehicle and relative to other pads. In examples when the pads are mounted on a fixture the secondary frame may not be attached to the fixture by pivots as illustrated in the figures but rather by an additional set of rams adapted to drive the secondary frame and thus the pads in a substantially horizontal plane. One or more linear races and bearings may also be used to provide support and direction to the horizontal movement of the secondary frame.

The positions of the pads are adjustable vertically and or horizontally. Depending on the operator the pads may be moved in a unison or may be moved individually.

The pads of the fixed form of scrum simulator are arranged and operate in a manner similar to that of the pads described above in relation to the vehicular scrum simulator shown in the figures.

The actuators are driven by a motor. In a preferred arrangement of this embodiment, the actuators are preferably double acting pneumatic or hydraulic rams, driven by a fluid pressurised by a motor, for example an electric motor.

Although this embodiment may be mounted to a fixed object and so may not include a vehicle as does the first form of the invention, it can perform actions such as driving backward the players training against the simulator, or allowing the players to move forward against the simulator. These simulations may be provided by incorporating pad and or secondary frame mounting arrangements allowing an extended range of horizontal movement, and by using pad or secondary frame actuators of an extended length. The players may thus drive forward against the fixed simulator or be driven back by the simulator at least a limited distance as permitted by the available range of horizontal pad movement.

Similarly, the fixed simulator can simulate, at least to a limited degree, a screwing or turning scrum, for example by horizontally advancing or retracting only one end of a row of pads.

As in the vehicular embodiment shown in the figures, the fixed scrum simulator may include sensors which monitor the pressure or force, or timing of the pressure or force, applied to the pads or to the beam on which the pads are mounted. Data provided by the sensors may be displayed on a readout or may be recorded and may be used to program the scrum simulator to repeat a particular pattern of scrum simulation. The fixed

scrum simulator may be programmed to operate under computer control in a manner similar to the vehicular scrum simulator described above.

In a third preferred form not shown, the sports training resistance device is a scrum simulator including a primary frame, a plurality of pads mounted on a frame and an impact and pressure sensor means.

The device may also have an actuator means adapted to absorb pressure asserted on the pads in use. This actuator means may consist of one or a series of bi-directional hydraulic or pneumatic rams and one or more of these rams may be adapted to move one or more or the pads in a manner similar to those described in relation to the first and second preferred forms. The hydraulic or pneumatic rams in combination with their hoses and suitable gauges may comprise the impact and pressure sensor means.

In other embodiments the impact and pressure sensor means may consist of load cells, strain gauges, a control processor and a display or similar. The control processor may be programmed to receive signals from the load cells (or similar) and actuate the actuator means to exert a programmed response.

INDUSTRIAL APPLICABILITY

The present invention is used to provide a sports training resistance device and more particularly a rugby scrum simulator for use in training athletes and sports teams.

CLAIMS

1. A motorised sports training resistance device comprising a ground contact vehicle including a motor adapted to move the vehicle along the ground and at least one impact member mounted on the vehicle and against which a player may impact in use.

2. The motorised sports training resistance device of claim 1 wherein the vehicle rides on an endless track.

3. The motorised sports training resistance device of claim 2 wherein the vehicle has two endless tracks which are drivable independently of each other.

4. The motorised sports training resistance device of claim 3 wherein there is also a control system.

5. The motorised sports training resistance of claim 4 wherein the control system allows an operator to control the operation of the endless tracks.

6. The motorised sports training resistance device of claim 5 wherein a plurality of impact members are mounted on the vehicle.

7. The motorised sports training resistance device of claim 6 wherein four impact members are mounted at one end of the vehicle the construction and arrangement being such that the impact members may be arranged in a substantially linear and horizontal row.

8. The motorised sports training resistance device of any one of claims 6 or 7 wherein the positions of the impact members relative to the vehicle are adjustable by an actuator means.

9. The motorised sports training resistance device of claim 8 wherein the control system allows an operator to control the operation of the actuator means.

10 The motorised sports training resistance device of claim 9 wherein the positions of the impact members relative to each other are adjustable by the actuator means.

11. The motorised sports training resistance device of any one of claims 8 to 10 wherein the actuator means includes a bi-directional linear actuator which is adapted to adjust the position of the impact members while the device is in use.

12. The motorised sports training resistance device of claim 11 wherein the actuator means includes a plurality of bi-directional linear actuators which are adapted to adjust the position of the impact members while the device is in use.

13. The motorised sports training resistance device of claim 12 wherein there is also an impact and pressure sensor means.

14. The motorised sports training resistance device of claim 13 wherein the impact and pressure sensor means includes a plurality or pressure sensors.

15. The motorised sports training resistance device of any one of claims 13 or 14 wherein the impact and pressure sensor means includes a display means.

16. The motorised sports training resistance device of any one of claims 14 to 16 wherein the bi-directional linear actuators are operated by hydraulic or pneumatic systems and the impact and pressure sensor means includes a gauge or gauges adapted to record and display pressure in the hydraulic or pneumatic systems.

17. The motorised sports training resistance device of any one of claims 14 to 16 wherein the impact and pressure sensor means include load cells and displays.

18. . The motorised sports training resistance device of any one of claims 16 or 17 wherein the control system includes a

processor means adapted to record and adjust the operation of the tracks and/or the actuator means in accordance with a pre-set program or in response to data fed to the processor by the impact and pressure measuring means.

19. The motorised sports training resistance device of claim 17 wherein the control system allows an operator to control the operation of the motor.

20. The motorised sports training resistance device of claim 17 wherein the tracks are made of a rubber material.

21. The motorised sports training resistance device of claim 1 wherein the vehicle rides on wheels.

22. A sports training resistance device including a ground contact vehicle and a plurality of impact members adjustably mounted to the ground contact vehicle and against which a player or players may impact in use, wherein the position of at least one impact member relative to the vehicle and to another impact member is, in use, adjustable by an actuator means.

23. The motorised sports training resistance device of claim 22 wherein four impact members are mounted at one end of the vehicle the construction and arrangement being such that the impact members may be arranged in a substantially linear and horizontal row.

24. The motorised sports training resistance device of claim 23 wherein the positions of all the impact members relative to the vehicle are adjustable by the actuator means.

25. The motorised sports training resistance device of claim 24 wherein the actuator means includes a plurality of bi-directional linear actuators which are adapted to adjust the position of the impact members while the device is in use.

26. The motorised sports training resistance device of claim 25 wherein the positions of the impact members relative to each other are adjustable by the actuator means.

27. The motorised sports training resistance device of claim 26 wherein each impact member includes a cushioned pad against which a player may impact in use.

28. The motorised sports training resistance device of any one of claims 22 to 27 wherein the ground contact vehicle includes a motor adapted to move the vehicle along the ground.

29. The motorised sports training resistance device of claim 28 wherein the vehicle rides on endless tracks.

30. The motorised sports training resistance device of claim 29 wherein the vehicle has two tracks which are drivable independently of each other.

31. The motorised sports training resistance device of claim 30 wherein the actuator means for the impact members operates using the motor that is also adapted to move the vehicle along the ground.

32. A sports training resistance device including a primary frame, at least one impact member mounted on the primary frame and against which a player may impact in use, and an impact and pressure sensor means.

33. The motorised sports training resistance device of claim 32wherein a plurality of impact members are mounted on the vehicle.

34. The motorised sports training resistance device of claim 33 wherein, the impact and pressure sensor means includes a plurality of sensors.

35. The motorised sports training resistance device of claim 34 wherein the impact and pressure sensor means includes a display means.

36. The motorised sports training resistance device of claim 35 wherein four impact members are mounted at one end of the vehicle the construction and arrangement being such that the impact members can be arranged in a substantially linear and horizontal row.

37. The motorised sports training resistance device of claim 36 wherein the positions of the impact members are adjustable by an actuator means.

38. The motorised sports training resistance device of claim 37 wherein the device also includes a processor means adapted to receive data from the impact and pressure sensor means.

39. The motorised sports training resistance device of claim 38 wherein the processor means is adapted to control the actuator means.

40. The motorised sports training resistance device of claim 39 wherein the vehicle includes a motor adapted to drive the vehicle on endless tracks.

41. The motorised sports training resistance device of claim 40 wherein the vehicle has two tracks which are drivable independently of each other.

42. The motorised sports training resistance device of claim 42 wherein the processor means is also adapted to control the endless tracks.

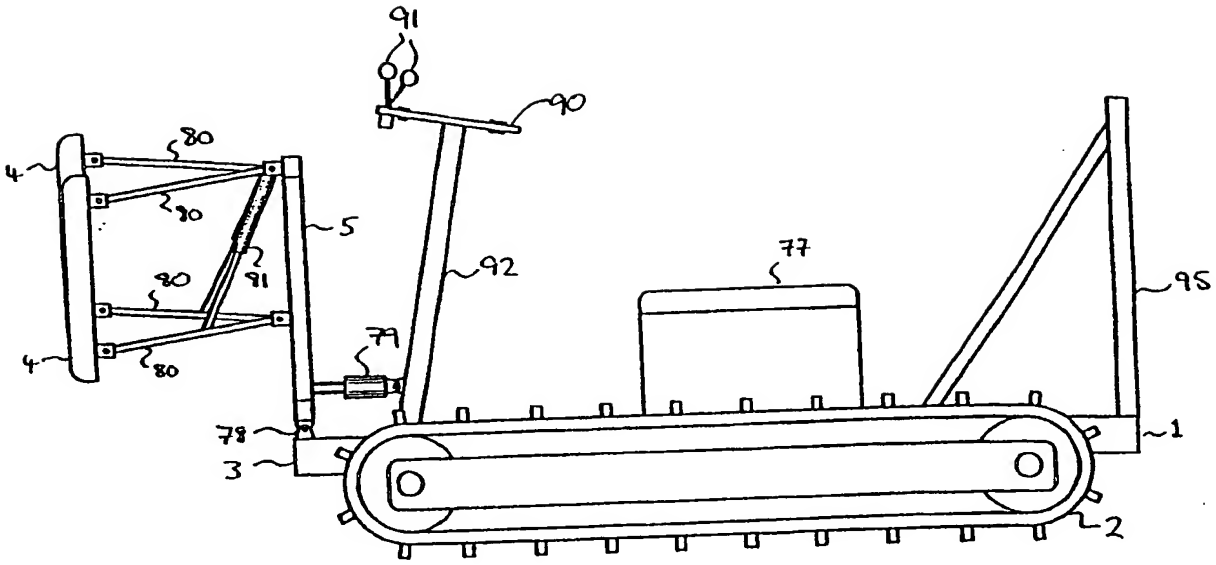


Fig. 1

Fig. 2.

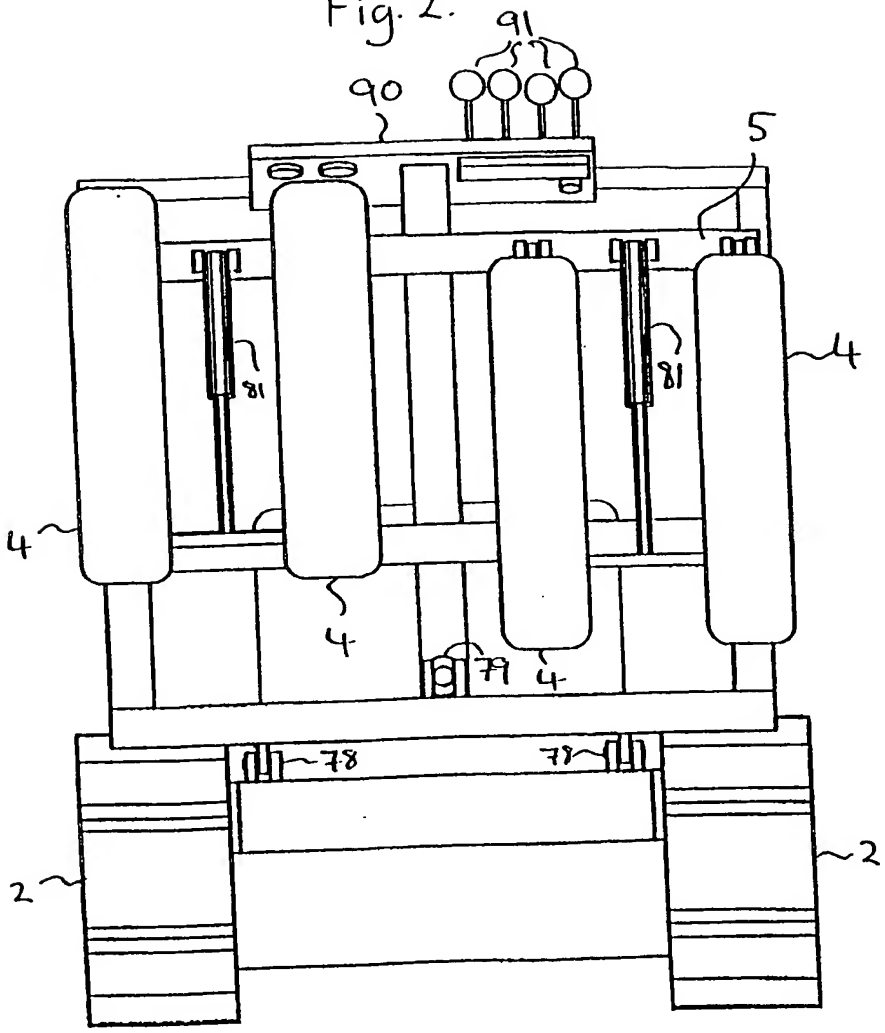
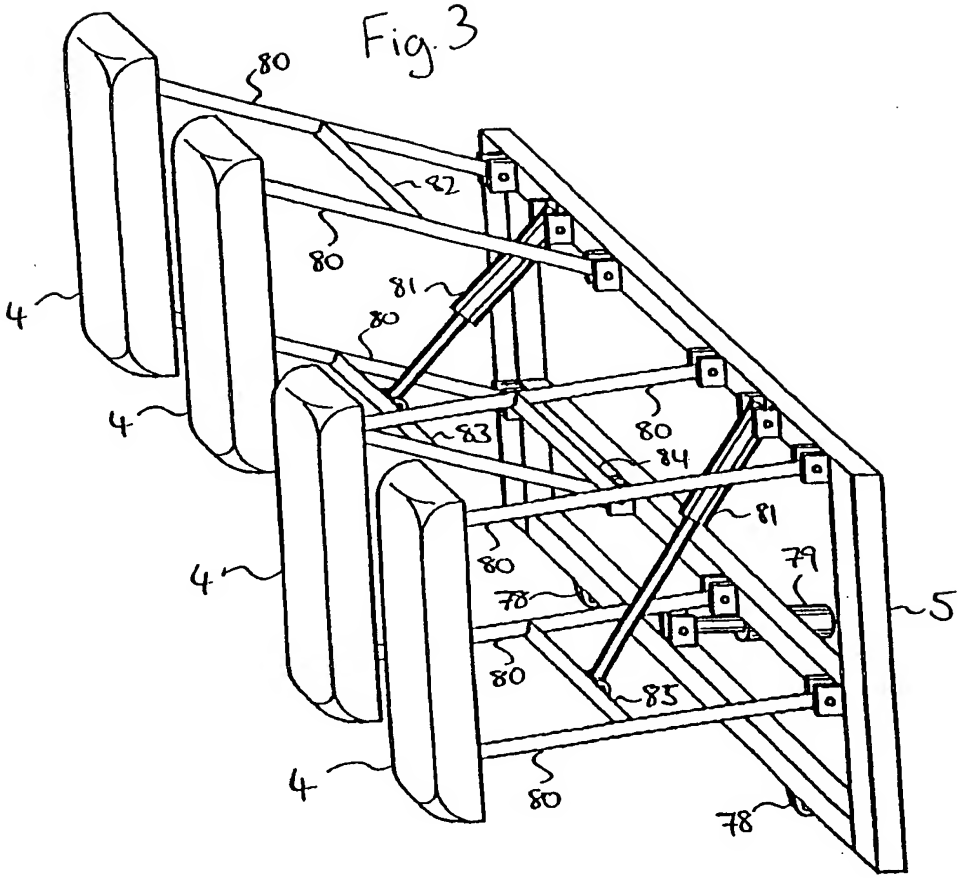


Fig. 3



INTERNATIONAL SEARCH REPORT

Intern ial Application No
PCT/NZ 00/00183

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A63B69/34

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 A63B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 743 821 A (WIRACHOWSKI KEVIN) 28 April 1998 (1998-04-28) the whole document	22,32-35
A		1,23-27, 36,37
A	US 5 474 290 A (RASCONA SEBASTIAN D ET AL) 12 December 1995 (1995-12-12) abstract; claims; figures	1,22,32

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
14 December 2000	22/12/2000

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